Scope of Work
Consulting Services for Investigation of Binational Desalination for the Benefit of Arizona, United States and Sonora, Mexico

Background and Purpose

It is generally recognized that development of new water resources will be necessary to meet municipal, industrial, environmental, recreational and other demands associated with expected growth in Arizona and Sonora, Mexico. In 1968, a report titled *Nuclear Power and Water Desalting Plants for Southwest United States and Northwest Mexico* was prepared by a joint study team consisting of the United States, Mexico, and the International Atomic Energy Agency. The purpose of the report was to "make a preliminary assessment of the technical and economic practicality of a dual-purpose nuclear power plant designed to produce fresh water and electricity for this area." The report associated a power supply with the water desalination facility, both in order to operate the proposed facility itself and to provide additional needed energy to Arizona and Sonora.

Other similar reports and papers have been prepared since 1968 and much more is known about the production capacities of the surface and ground water systems that are relied upon. Efforts are currently underway to study how existing systems can be augmented and managed to meet the myriad and often conflicting demands. Coordination among the upper and lower Colorado River basin states and Mexico has become increasingly important as the supply of Colorado River water is used to meet the needs of growing populations and shifting industrial and environmental demands. It is time to begin efforts to plan for additional water for Arizona and Sonora, and the associated power requirements, within the context of the other water supply systems and the legal obligations and restrictions associated with them. This study will acknowledge the other regional efforts related to water supply development being considered, but will focus on water supply for Arizona and Sonora.

Scope of Services

Salt River Project (SRP) and Central Arizona Project (CAP), in consultation with the Arizona Department of Water Resources (ADWR) and Bureau of Reclamation (Reclamation), have determined it is in their and the State of Arizona's best interest to contract with HDR Engineering to initiate the planning of an ocean desalination project and associated power generation facility in close coordination with officials from Sonora and the Mexican government. Therefore, SRP and CAP (Owners) have each agreed to enter into separate general consulting services contracts with HDR for an amount not to exceed $50,000 (total of $100,000 for the HDR work effort) for HDR to provide the general services described below.

HDR will manage the project and receive information and input from SRP and CAP staff. The team will conduct research to further refine and develop master plan level cost estimates for desalination alternatives. It is recognized that as these alternatives are conceptualized, modifications may occur or additional alternatives for evaluation may be

developed as a result of discussions with Mexican officials and their consultant. In the course of the study, HDR will be flexible to respond to these needs at the discretion of the Owners. Alternatives may include but are not restricted to the following concepts:

- Ocean water desalination plant located on the northeast Gulf of California, with two levels of product water:
    - Level 1 - product water suitable for irrigation delivered to Imperial Dam for delivery to the Colorado River
    - Level 2 – product water suitable for municipal uses delivered in Mexico
    - New power generation is constructed to provide energy for the desalination plant
- Ocean water desalination plant located on the Gulf of California with product water suitable for municipal and agricultural use:
    - Product water used to meet municipal uses delivered in Mexico
    - Agricultural lands in Mexico irrigated with Colorado River water irrigated instead with desalinated water and the United States' obligation to deliver Colorado River water to Mexico is reduced accordingly
    - New power generation is constructed to provide energy for the desalination plant
- Brackish groundwater desalination plant located in Mexico with product water suitable for municipal and agricultural use:
    - Product water used to meet municipal uses delivered in Mexico
    - Agricultural lands in Mexico irrigated with Colorado River water instead with desalinated water and the United States' obligation to deliver Colorado River water to Mexico is reduced accordingly
    - New power generation is constructed to provide energy for the desalination plant

The project team will develop related maps, schematics, and other graphics that will help convey the proposed alternative concepts with minimal need for explanation in either English or Spanish. HDR will organize, facilitate, attend, and summarize meetings as requested by the Owners. At the discretion of the Owners, HDR will assist in the identification of a qualified consulting firm in Mexico, with which the Mexican officials are comfortable and will contract separately. HDR will coordinate with the Mexican consulting firm. HDR will prepare draft and final reports that can be used in support of proposals by CAP, SRP, and Mexican officials to advance the concept of desalinated ocean water for the benefit of Sonora and Arizona.

Specific Services Necessary to Develop Cost Estimates for the Alternatives:

- Identify type of water demand to be met through desalination and study the optimal size, configuration, and output for a potential desalination project including estimated costs of current ocean desalination technology for two finished water TDS concentrations.
- Identify one potential location for a desalination facility.

- Determine costs for pipeline construction from desalination facility to Imperial Dam and destinations unknown to meet domestic (municipal and industrial) demands in Mexico.
- Determine availability of power transmission for desalination facility.
- Determine power generation requirements and a generation facility location.
- Evaluate issues associated with retiring agricultural land in Mexico that has rights to the Colorado River, and reducing the U.S. obligation to deliver Colorado River water in a commensurate amount.
- Identify costs of brackish groundwater desalination technology in Mexico for production of domestic supply (one finished water TDS concentration).

Project Management

The work will be done as a team by HDR, SRP, and CAP staff, with HDR serving in a project management role to drive the project to completion by January 1, 2009, according to the attached schedule. HDR will work as though an extension of SRP and CAP staff, and in close collaboration with SRP and CAP personnel, to execute the scope of services. SRP and CAP personnel will be involved in the data gathering, research, graphics development, and report writing and review. HDR will provide monthly progress reports to Owner project managers, which will descriptions of the level of progress for each task, costs to date, and cost and time estimates to complete tasks and the project.